IAEA
International Atomic Energy Agency
Atoms for Peace and Development

Technical Meeting on Digital Instrumentation and Control Systems for New and Existing Research Reactors

IAEA Headquarters
Vienna, Austria

3-6 July 2023

Ref. No.: EVT2205377 (Hybrid Event)

Information Sheet

A. Introduction

Research reactors rely extensively on instrumentation and control (I&C) systems for protection, control, supervision and monitoring. I&C systems are installed throughout the facility and are vital parts of normal and off-normal operations. I&C systems have an important function in ensuring the safety of research reactors. Although analogue I&C and measurement systems provided the above functions satisfactorily, during the past decades, research reactors are facing challenges in several I&C areas due to ageing and obsolescence of components and equipment. With licence renewals and power uprates, the long-term operation and maintenance of obsolete I&C systems may not be a cost-effective and reliable option. The efforts needed to maintain or increase the reliability and useful life of existing I&C systems may be greater in the long run than those involved in upgrading I&C systems to new digital or hybrid systems.

IAEA Safety Standards Series No. SSR-3, *Safety of Research Reactors*, establishes the requirements related to the I&C systems for research reactors. IAEA publication entitled *Digital Instrumentation and Control System for New and Existing Research Reactors* (IAEA Nuclear Energy Series No. NR-G-5.1, Vienna, 2021) provides engineering guidance on the design, and operational aspects of digital I&C systems for the refurbishment of existing facilities and for new research reactors. Key areas addressed include codes and standards applicability, licensing issues, dealing with the change in human-system interface from

analogue to digital technology, software verification and validation activities, periodic testing and inspection, and configuration management. The IAEA has published a Safety Guide entitled *Instrumentation and Control Systems and Software Important to Safety for Research Reactors* (IAEA Safety Standards Series No. SSG-37, Vienna, 2015), which also addresses the refurbishment and modernization of I&C systems.

There are several reasons for considering the modernization of I&C systems in a research reactor. Obsolescence is a major consideration. This can result from causes such as lack of spare parts, supplier support and functional capabilities needed to satisfy current and future needs. Ageing of the I&C systems is another consideration which leads to difficulties such as decreasing reliability and availability of operating research reactors, increasing costs to maintain acceptable performance, and the lack of experienced staff for maintenance and engineering. In addition, the need for better reliability and availability may require the capabilities of new technology that are not possible or practicable with the older technology.

Refurbishments and life extensions of research reactors may also need to address the obsolescence issues. In addition, older technology limits the possibilities for adding new beneficial capabilities to the facility systems and interfaces. New technology provides the opportunity to improve plant performance, human-system interface functionality, and reliability; to enhance operator performance and reliability; and to address difficulties in finding young professionals who possess knowledge of, and experience with, the older analogue technology. In addition, there may be changes in regulatory requirements that could necessitate modernization activities.

Instrumentation and control upgrades at operating facilities require the use of digital I&C equipment. A digital I&C upgrade could also be an effective means to enhance the facility's safety and I&C system functionality, manage obsolescence, and mitigate the increasing failure liability of ageing analogue systems. Many of the planning and implementation tasks of a digital I&C upgrade project are also relevant to the design and construction of new facilities since most equipment in new research reactors will be digital.

The IAEA is working to systematically pool existing knowledge related to the use of digital I&C systems in research reactors that can be shared within the community of research reactor owners, operators and regulatory authorities.

This event will address key areas of modernization projects for I&C systems in research reactors. The IAEA is providing an organizational basis and a working environment for the participants representing various areas of I&C development, system design and testing, installation operation and licensing of I&C systems.

B. Objectives

The purpose of the event is to exchange information and experiences related to the technical and managerial aspects of research reactor projects (both modernization projects and projects for the design and construction of new facilities) involving digital I&C systems. The information exchange at the event will take place through presentations and discussions on good practices and experience gained in completed or planned modernization projects.

C. Target Audience

The event is intended for individuals from Member States with an operating research reactor facility or Member States that have initiated a new research reactor project. Participants should be individuals in charge of I&C systems at their respective research reactor facilities. Specialists from regulatory bodies who are in charge of the review and assessment of I&C systems for research reactors can also participate.

D. Working Language

The working language of the event will be English.

E. Scope

Input from international experts is sought to cover all technical areas relevant to the complex process of I&C system modernization at existing research reactors and in new facilities that are in the process of being designed or constructed. Presentations should focus on the following aspects of actual cases of modernization projects or projects for the design and construction of new research reactors:

- Objectives and scope of the modernization project;
- Basis for modernization and I&C functions to be improved in the modernization project;
- Configuration management for research reactor hardware and software;
- Review of safety analysis and licensing of digital I&C technologies;
- Benefits, cost effectiveness and implementation strategy;
- Obsolescence and degradation concerns;
- Design, installation, testing and acceptance;
- Regulatory aspects and safety considerations during design, commissioning and operation of I&C systems;
- Training/retraining and qualification of the operation and maintenance staff; and
- Documentation.

F. Participation and Registration

All persons wishing to participate in the event have to be designated by an IAEA Member State or should be members of organizations that have been invited to attend.

In order to be designated by an IAEA Member State, participants are requested to send the **Participation Form (Form A)** to their competent national authority (e.g. Ministry of Foreign Affairs, Permanent Mission

to the IAEA or National Atomic Energy Authority) for onward transmission to the IAEA by **5 May 2023.** Participants who are members of an organization invited to attend are requested to send the **Participation Form (Form A)** through their organization to the IAEA by the above deadline (see contact details in Section K below).

Selected participants will be informed in due course on the procedures to be followed with regard to administrative and financial matters.

Participants are hereby informed that the personal data they submit will be processed in line with the Agency's Personal Data and Privacy Policy and is collected solely for the purpose(s) of reviewing and assessing the application and to complete logistical arrangements where required. Further information can be found in the Data Processing Notice concerning IAEA InTouch+ platform.

G. Submission of Presentations

Each participant is encouraged to give a presentation on the topics outlined in Section E above and should send an abstract to the Scientific Secretaries. The abstracts should be received not later than **5 May 2023**. Abstracts will be used to organise the presentations for the event and to establish the final programme. Presentations should be submitted to the IAEA not later than **23 June 2023.**

The time for each presentation will be limited to 25 minutes (subject to change, depending on the number of presenters) in order to have sufficient time for discussion. Computer-based projection facilities will be provided.

H. Expenditures and Grants

No registration fee is charged to participants.

The IAEA is generally not in a position to bear the travel and other costs of participants in the event. The IAEA has, however, limited funds at its disposal to help meet the cost of attendance of certain participants. Upon specific request, such assistance may be offered to normally one participant per country, provided that, in the IAEA's view, the participant will make an important contribution to his or her State's I&C systems for research reactors.

The application for financial support should be made using the **Grant Application Form (Form C)** which has to be stamped, signed and submitted by the competent national authority to the IAEA together with the **Participation Form (Form A)** by **5 May 2023**.

I. Venue

The event will be held at the Vienna International Centre (VIC), where the IAEA's Headquarters are located. Participants must make their own travel and accommodation arrangements.

General information on the VIC and other practical details, such as a list of hotels offering a reduced rate for IAEA participants, are listed on the following IAEA web page:
https://www.iaea.org/events.**Error! Hyperlink reference not valid.**

Participants are advised to arrive at Checkpoint 1/Gate 1 of the VIC one hour before the start of the event on the first day in order to allow for timely registration. Participants will need to present an official photo identification document in order to be admitted to the VIC premises.

J. Visas

Participants who require a visa to enter Austria should submit the necessary application to the nearest diplomatic or consular representative of Austria at least four weeks before they travel to Austria. Since Austria is a Schengen State, persons requiring a visa will have to apply for a Schengen visa. In States where Austria has no diplomatic mission, visas can be obtained from the consular authority of a Schengen Partner State representing Austria in the country in question.

K. IAEA Contacts

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Subsequent correspondence on scientific matters should be sent to the Scientific Secretaries and correspondence on other matters related to the event to the Administrative Secretary.